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Japan

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World's Fastest Josephson Computer Developed

91P60013 Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 15 Sep 90 p 3

[Article by Ke Guang [4430 0342]: 'Hitachi Puts Out World's Fastest Josephson Computer']

[Text] Hitachi recently developed the world's fastest Josephson[-junction] computer. This new type of computer, combining the [Josephson-junction] theoretical circuits with memory circuits, is the world's first to realize a speed of 1GIPS (one billion instructions per second), a speed about 15 times that of a mainframe based on traditional semiconductor devices.

New Supercomputers Announced

NEC's ACOS System 3800 Series

91P60016A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 32, 15 Aug 90 p 11

[Unsigned article: "NEC Puts Out World's Fastest General-Purpose Supercomputers"]

[Summary] On 4 July, NEC issued a statement describing its new general-purpose supercomputers, which have the highest performance in the world. For scientific calculations, the top model in the new "ACOS System 3800" series has a peak speed of 500 million operations per second (MOPS). Among general-purpose supercomputers, Hitachi Ltd. had already issued a statement in June on Hitachi's new supercomputer capable of 210 MOPS, only to be soon outdone by NEC.

The new "ACOS System 3800" computers are high-performance varieties of the "1500" general-purpose series put out by NEC last year. Seven models in the new series have an operations processing unit. The highest-performance computer, the model 60, has a speed of 370 MOPS for transaction processing and 500 MOPS for scientific calculations. Maximum data input space is 128 million Mbytes.

Matsushita to Enter Market

90P60016B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 37, 26 Sep 90 p 13

[Summary] Matsushita Electric Industry Company will enter the market for supercomputers used for ultra-high-speed S&T calculations. This year, the firm plans to market the ADENA 256, which utilizes 256 64-bit FPUs [floating-point units] linked together to form a parallel processor with a calculating speed of 2.6 GFLOPS [billion floating-point operations per second]. Selling price will be 150 million yen, much lower than the price for similar varieties now available and selling for 1 billion yen apiece. By 1992, Matsushita will market the world's highest-level model, which will have a calculating speed of 25 GFLOPS. By 1995-1996, the firm plans to commercialize its next-generation supercomputer, which will have a calculation speed of 100 GFLOPS.

Japanese supercomputer makers have been facing difficulties commercializing their supercomputers due to insufficiently strong software. The key to whether or not Matsushita will succeed lies in the company's future software development.

Hitachi Develops World's First 64Mbit DRAM

91P60014A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 26, 4 Jul 90 p 12

[Unsigned article: "Japan Develops 64Mbit DRAM"]

[Summary] Hitachi announced on 7 June 1990 that it had developed the world's first 64Mbit DRAM (dynamic random access memory). This chip, which has an information storage capacity equivalent to that of 250 pages of a newspaper, operates with one 1.5-volt battery. Hitachi plans to begin batch productionn of the chips in 1995.

The 198-square-millimeter silicon chip has over 140 million circuit elements integrated onto it. The superfine processing technique used to obtain the 0.3-micron line widths includes a scanning electron beam apparatus. The chip has a 50-nanosecond access time and a power dissipation of 44 milliwatts. The Hitachi spokesman predicted that NEC and Toshiba Corporation would also develop the 64Mbit DRAM in the near future.

New Plasma Etching Technology Developed by NEC

91P60014B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 27, 11 Jul 90 p 10

[Unsigned article: "Japan Develops New Plasma Etching Technology"]

[Summary] NEC recently developed a new plasma etching technology which has demonstrated promising potential in the fabrication of 64Mbit DRAMs. According to the report in NIKKEI SANGYO SHIMBUN, the new technology utilizes the electron cyclotron resonance technique to generate the plasma, which etches the 20-centimeter-diameter wafers. Plasma current density has been raised from earlier values of 2-3 milliamperes per square centimeter to 15-20mA/cm^2, permitting high-speed etching.

Fujitsu Invests Heavily in GaAs Technology

91P60014C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 29, 25 Jul 90 p 10

[Unsigned article: "Fujitsu Initiates Major Investment in GaAs Technology"]

[Summary] Fujitsu Yamanashi Electronics Corp., having decided to invest heavily in gallium arsenide (GaAs) technology, is constructing a GaAs-chip-making plant at its Yamanashi facility. The new plant will mass-produce GaAs ICs and high electron mobility transistors (HEMTs). This Fujitsu [Ltd.] subsidiary, capitalized at 12 billion yen, will receive a further 30 billion yen in new capital from the parent corporation for construction of the new plant. The 17,000-square-meter facility is scheduled to be operational in Spring 1991. Revenue can reach 5-6 billion yen, and increase to 10-12 billion yen in 1992.

The decision has been prompted by announcements from U.S. manufacturers of supercomputers, minisupercomputers, and workstations that they will employ GaAs chips in their new-generation systems. Fujitsu's goal is to produce 1 million GaAs chips in 1991 and to increase output to 2-3 million chips in 1992.

This will be the first facility in the world to mass-produce GaAs HEMTs. These high-speed devices have line widths under 0.5 micron, at which point the short-channel effect is relatively small. Many of the devices are to be incorporated into dish satellite receiving antennas, demand for which is rapidly increasing. The company plans to produce 5 million HEMTs per month in 1991, mainly for use in satellite receivers. Another part of Fujitsu's development plan is to build a compound-semiconductor research center within the current fiscal year.

NTT Develops World's Fastest Transistor

90P60014D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 31, 8 Aug 90 p 15

[Unsigned article: "NTT Develops World's Fastest Transistor"]

[Summary] NTT announced on 27 June that it has developed the world's fastest transistor. According to the experimental results, this transistor can regulate current at a frequency of 170GHz [i.e., a speed of 1/170 of a nanosecond], 1.7 times the performance of the company's product developed three years ago. Unlike superconducting elements, this transistor does not require a low-temperature environment, and can operate at room temperature. If the company can integrate the transistors onto an IC, it can raise the speed of present supercomputers over 500 percent and also be of value in high-capacity fiber-optic communications systems.

The new product, called a "ballistic transport transistor," uses GaAs thin films. Electron speed in the new device is as high as 700 kilometers per second. If the devices can be integrated onto a chip, the chip will be able to process 30 billion digital signals per second, five times the value for the fastest silicon transistors today. Optical transmission speed can be raised to 20 times that possible with current transistors. NTT plans to further miniaturize the transistor and thus raise speed another 10 percent.

Fujitsu Develops GaAs VLSI

90P60014E Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 33, 29 Aug 90 p 27

[Unsigned article: "Fujitsu Develops GaAs VLSI"]

[Summary] Fujitsu announced that it is the first company to have successfully developed very-large-scale integrated circuit (VLSI) with a GAAs substrate. Using technology from the U.S. semiconductor maker Weidai-sai (phonetic) Semiconductor Company, Fujitsu has come out with chips that have 67 percent less power dissipation than silicon semiconductor chips.

Last November [1989], Fujitsu established technical cooperation relations with the U.S. firm and received rights to develop the VLSI technology. The new products, called the MB53000 series, have a propagation delay of 80 picoseconds, comparable to that of the fastest silicon semiconductors today, but with only one-third the powr dissipation of the lattter. The company will begin receiving orders for these GaAs VLSI chips—which are currently beingh further miniaturized—in October [1990].

Mitsubishi Develops Optical Neurochip that Can Recognize Alphabet

90P60014F Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 34, 5 Sep 90 p 15

[Unsigned article: "Mitsubishi Electric Develops Optical Neurochip that Can Recognize the 26 Letters of the Alphabet"]

[Summary] Mitsubishi Electric Corporation recently developed an optical neurochip that can recognize the 26 letters of the English alphabet. This chip is fabricated by a process which highly integrates compound semiconductors with light-emitting and light-receiving functions, and has associative functions. This chip, the first single chip developed anywhere in the world which can recognize all the letters of the alphabet, will be of great benefit to the further development of optical neurocomputers.

The 1-square-centimeter chip integrates 66 LEDs, 3468 spatial light modulator elements, and 110 light-receiving elements onto one GaAs chip. The light-emitting and light-receiving elements are all made from the compound semiconductor AlGaAs. Each chip has 90 neural cells in a three-layer structure; there are 35 neural cells in the information input layer, 29 neural cells in the middle layer, and 26 neural cells in the information output layer. Accuracy of letter recognition has reached 100 percent. The chip operates with a system based on level of 'fuzziness' that was independently developed by the corporation, and can provide an accurate output via its associative functions when an incomplete letter is input.

Mitsubishi Electric was the first to announce (July of last year) that is had developed an optical neurochip apparatus that could recognize the 26 letters of the alphabet, but the device was too bulky; the corporation therefore compressed it down into one chip,. Mitsubishi's further goal is to realize a multi-optical-chip optical neurocomputer.

Government Laboratories, Research Programs Administered by Industrial Science & Technology Agency, MITI

90FE0196A Tokyo SHIKEN KENKYUSHO KENKYU KEIKAKU in Japanese 30 Sep 89 pp 3-21

[Table of Contents, foreword, and excerpt of research plans]

[Text] **Table of Contents**

Foreword to This Edition

This compilation of research plans was published in order to present an outline of FY89 research plans, and an outline of R&D support and service operations, in research institutions subordinate to the Agency for Industrial Science and Technology. This is the 28th edition since publication began in 1963; earlier editions have been highly rated as the most appropriate publication for learning the essential facts of AIST's research institutes.

Technological innovation has been the motivating force developing the economy and society and bringing us an abundant life from the industrial revolution on up to today. That Japan has gone through a period of postwar industrial recovery and high economic growth and is now one of the world's leading economic powers may be called a result of the progress of technological innovation and the active promotion of R&D, under cooperation among industry, academia and government, to establish a technology-based nation. To build up a foundation for long-range development into the 21st century, it is essential that Japan, with its limited resources and territory, promote the development of technologies in preparation for broad and diverse changes.

On the other hand, Japan has come to occupy an important position in the world economy, and is now in a position to bear a commensurate burden in the area of development of technology for the harmonious growth of the world economy. There are great international expectations of Japanese contributions in basic, creative research, as well as in research on application and development.

With that recognition, the 16 research institutes under the jurisdiction of AIST are carrying out the development of basic, pioneering technology on new materials, biological functions, electronics and so on, as a foundation for Japan's future technological innovations. They are also steadily promoting technological R&D as a basis for industrial activity and the lives of the people, including safety and security technology, antipollution technology, and instrumentation and standardization technology.

In addition to encouraging development of industrial technology that applies biological functions in order to further enhance basic technology in the field of biological functions that has become a focus of research in the Human Frontiers Science Program Japan is promoting, we have just begun R&D on global environmental technology, encompassing artificial photosynthesis and explication of the mechanisms by which problems arise, in order to cope with worldwide environmental problems such as warming of the climate resulting from carbon dioxide, which have become a matter of worldwide concern because of the possibility they will have a great effect on industrial society and human life.

For Japan, which will seek the development of the world, as well as of itself, through the development of technology, the further development of such technology is a necessity; it is expected that the research institutes subordinate to AIST will continue to play a central role in that. In this time of a constrained national fiscal situation, the situation surrounding the research institutes is a harsh one, but we intend to make every effort to fulfill that expectation by making research as active as possible and producing superior research results. We request your support, cooperation and encouragement to that end.

AIST Director General Tsutomu Sugiura, September 1989

Use of the FY89 Edition of "Research Plans of Research Institutes of AIST"

Research Institutes of AIST

This book consists of three parts. The first introduces the FY89 research plans of the 16 research institutes attached to AIST: The National Research laboratory of Metrology (NLRM), the Mechanical Engineering Laboratory (MEL), the National Chemical Laboratory for Industry, the Fermentation Research Institute (FRI), the Research Institute for Polymers and Textiles (RIPT), the Geological Survey of Japan (GSJ), the Electrotechnical Laboratory (ETL), the Industrial Products Research Institute (PRI), the National Research Institute for Pollution and Resources (NRIPR), the Government Industrial Development Laboratory, Hokkaido (GIDL Hokkaido), the Government Industrial Research Institute, Tohoku (GIRL Tohoku), the Government Industrial Research Institute, Nagoya (GIRL Nagoya), the Government Industrial Research Institute, Osaka (GIRL Osaka), the Government Industrial Research Institute, Chugoku (GIRL Chugoku), the Government Industrial Research Institute, Shikoku (GIRL Shikoku), and the Government Industrial Research Institute, Kyushu

(GIRL Kyushu). The second and third parts describe the operations and personnel of the institutes.

Nine of these institutes, from NLRM through NRIPR, were transferred to Tsukuba Science City beginning in FY79. They make up the core structure of AIST.

The goals of the 16 research institutes are to raise the technological level of the mining and manufacturing industries of Japan, and to create pioneering technologies. In them, approximately 2,600 researchers are carrying out a variety of experimental research on the basis of close coordination and coordination with other research institutes and universities, and between government institutions and private industry.

With a budget of ¥45.8 billion (FY89) and employing a total of 3,436, they constitute about one-fourth of all national research institutes. Their accomplishments have grown to 10,987 patent actions (as of March 1989).

Part 1

The experimental research can be generally divided into two groups. The first group is the R&D the institutes do on tasks they have set themselves. The second group consists of tasks given to the institutes from the outside. The work done under the AIST budget in the first group includes ordinary research (targeted basic research) and special research (administratively required development research and large-scale targeted basic research).

There are now some 650 research topics within the ordinary research. Special research is being carried out on over 250 topics in 23 large categories, including new materials, bionics, electronic technology and seismic predictions. The research projects in the first group that are being carried out for other agencies and ministries are mine safety technology (ANRE), small business measures technology (SMEA), technology for the peaceful use of atomic energy (STA), antipollution technology (EA), the international industrial technology project (ITIT, MITI's Industrial Policy Bureau) and research cooperation project promotion activities (funded by MITI's IPB). The second group is also divided between those projects relying on the AIST budget and those funded by other agencies. The former includes the National Research and Development Program (large-scale projects), new energy technology (Sunshine Project), energy conservation technology (Moonlight Project), medical and welfare equipment technology, basic technologies for future industries, major regional technology development, industrial technology applying biological functions and global environment technology. The latter consists of research under the Science and Technology Promotion and Coordination Fund (STA).

The research topics for ordinary research and special research for each research institute are listed on pp 25-68, and for each major category of research on pp 70-99. Following that, the ordinary research and special research is outlined by major category.

Part 2

Research done at AIST is managed on the basis of "Guidelines for Management of Research at AIST Research Institutes" and "Essentials of Implementation of the Guidelines." Please see pp 437-442 for the main points.

Activities related to experimental research in AIST include achieving a close exchange among the research institutes within the agency by establishing Comprehensive Research Promotion Councils to effectively and comprehensively promote important research results that involve several research institutes. Eight Comprehensive Research Promotion Councils are active at present, dealing with high polymers, inorganic and composite materials, analytical and applied metrology, bionics, industrial pollution, biotechnology, mechatronics and resources. Please see pp 445-447 in connection with that.

Under the mobile researcher system, an active exchange of researchers is carried out by inviting researchers from the outside and sending out researchers from AIST research institutes; this contributes to the improvement of research results, and to their spread. Please see p 451 for an outline of the mobile researcher system.

AIST is carrying out joint research with universities and the private sector, and a system of performing research commissioned by private enterprises. Please see pp 452-462 for regulations on joint research, and pp 475-477 for regulations on commissioned research.

It also provides technical guidance and technical consulting services to companies and others; please see p 478.

Requests for experiments and analyses, and use of facilities at the research institutes is also possible; the regulations are given on pp 481-484. Under certain circumstances it is possible to borrow the equipment and instruments of the research facilities; please see pp 485-487 for the regulations.

In order to further exchanges between the research institutes of AIST and public research institutions, an Industrial Technology Liaison Conference has been established; in cooperation with SMEA and regional Bureaus of International Trade and Industry, it attempts to put the R&D efforts of AIST's research institutions to use in regional technology R&D. Eight topical contact groups and eight regional Industrial Technology Liaison Conferences are active under the Liaison Conference; please see pp 491-504 for a description.

Industrial property rights, including AIST patents, utility models and designs, that are obtained from the various activities described above are held by the director general of AIST. As of 31 March 1988 there were 8,199 such properties (7,130 domestic and 1,069 foreign), and applications had been filed for another

8,761 (8,127 domestic and 634 foreign). Of these properties, 748 are under license to 991 companies, resulting in revenues of about ¥291.13 million in FY87. Those wishing to license industrial property rights under the control of the director general of AIST are asked to refer to pp 507-521, then consult with the Japan Industrial Technology Association (8th floor, 20-Mori Bldg, 2-7-4 Nishi Shimbashi, Minato-ku, Tokyo, Tel. 03-591-6271).

Historical Development of AIST Research Institutes

August 1948—Research institutes under Ministry of Commerce and Industry integrated as an external organization of that ministry, and Electrical Laboratory of the Ministry of Telecommunications transferred (except for some telecommunications functions). Standards department of Bureau of Patents and Standards brought in for formation of Agency of Industrial Technology as the administrative and general research organization involved with mining and industrial technology.

July 1949—Kyushu Mine Safety Laboratory and Hokkaido Mine Safety Laboratory integrated for establishment of Mining Technology Institute.

January 1951—Thermal management functions transferred to AIST from Agency of Natural Resources.

April 1952—Nagoya branches of Mechanical Engineering Laboratory and Tokyo Industrial Laboratory combined with Ceramics Laboratory for establishment of Government Industrial Research Institute, Nagoya. Fuels Laboratory and Mining Technology Institute combined for establishment of Resource Technology Research Institute.

August 1952—Name changed to Agency of Industrial Science and Technology in reform of administrative organizations; made an external organization of the Ministry of International Trade and Industry.

April 1960—Hokkaido Industrial Development Institute established.

April 1962—Given administrative responsibility for technology within MITI through organizational reform.

July 1964—Government Industrial Research Institute, Kyushu, established.

November 1966—Large-scale industrial R&D system established.

July 1967—Government Industrial Research Institute, Shikoku, and Government Industrial Research Institute, Tohoku, established.

July 1969—Names of Fermentation Laboratory, Textiles Industrial Research Institute and Industrial Crafts Research Institute renamed to Fermentation Research Institute, Research Institute for Polymers and Textiles and Industrial Products Research Institute.

July 1970—Electrical Laboratory and Resource Research Institute renamed to ElectroTechnical Laboratory and Research Institute for Pollution and Resources.

April 1971—Mechanical Laboratory changed to Mechanical Engineering Laboratory.

July 1971—Government Industrial Research Institute, Chugoku, established.

July 1973—Council on Industrial Science and Technology disestablished as organ attached to AIST; Industrial Technology Council established subordinate to MITI.

July 1974—Sunshine Project (New Energy Technology R&D Project) inaugurated.

July 1975—Thermal management functions transferred from AIST to Agency of Natural Resources and Energy.

October 1978—Moonlight Project (Energy Conservation Technology R&D Project) inaugurated.

September 1979—Government Industrial Research Institute, Tokyo renamed to Chemical Laboratory for Industry.

September 1979—Nine research institutes in Tokyo transferred to Tsukuba Science Center (completed in March 1980).

April 1981—R&D Project of Basic Technologies for Future Industries inaugurated.

December 1981—Tsukuba Science Center Nr. 2 completed.

December 1982—Major Regional R&D System inaugurated.

April 1984—Regional Technology Exchange Promotion Project inaugurated.

April 1985—Act concerning Facilitation of Key Technology Research implemented.

November 1986—Act concerning Research Exchange implemented.

April 1988—System of R&D on Industrial Technology applying Biological Functions inaugurated.

October 1988—Act concerning Provision of R&D System on Key Technology implemented.

Structure of Agency of Industrial Science and Technology

Agency Proper
- General Coordination Department
  - General Coordination Division
    (coordination within the agency, planning and drafting of policies on mining and manufacturing technology documents, Industrial Technology Council etc.)

Personnel Division
(personnel and welfare)
Budget and Accounts Division
(accounts, supplies, administrative properties)
Deputy Director General for Technological Affairs
(research administration and international affairs)
Research Administration Division
(research plans for affiliated research institutes, liaison with public and private research institutions, management of government patents)
Research Coordination Division
(planning of research regarding technology for antipollution measures and nuclear energy, and liaison with public and private research institutions)
Planning Division
(establishing research framework for research institutes)
Senior Officer for Regional Technology Planning
(planning and liaison regarding advancement and improvement of regional technology)
International Research and Development Cooperation Division
(international cooperation on S&T related to mining and manufacturing)
Deputy Director General for Technological Affairs
(planning)
Technology Promotion Division
(assistance (including tax preferences and loans) to private sector R&D on mining and manufacturing technology, promotion of R&D cooperatives and R&D on medical and welfare equipment technology)
Technology Planning Division
(drafting overall policy on S&T related to mining and manufacturing, and administration of the Key Technology Center)
Technology Research and Information Division
(technology research, technology assessment, public relations, library etc.)
AIST Branch of National Library
Deputy Director General for Technological Affairs
(technology development)
Director for Planning of Basic Technology for Future Industries
(planning and general management of R&D on basic technologies for future industries)
Senior Officer for Technology for Future Industries
(promotion of specific tasks regarding R&D on basic technologies for future industries)
Senior Executive Officer for Development Programs
(general management of large-scale industrial technology R&D)
Senior Officer for Development Programs
(large-scale industrial technology R&D: computer-interoperable database system, manganese nodules, high-speed computer system, automated sewing system, advanced robot technology, new water treatment system, advanced material processing system, fine chemicals, supersonic transport propulsion system, underground space development technology)
Senior Executive Officer for Development Programs
(general management of new energy technology R&D)
Senior Officers for Development Programs
(new energy technology R&D: solar, coal, geothermal and hydrogen fuel)
Senior Executive Officer for Development Programs
(general management of energy conservation technology R&D)
Senior Officers for Development Programs
(energy conservation technology R&D: high-efficency gas turbines, new batteries, fuel cells, superconductivity, Stirling engines, super heat pumps)
Tsukuba Superintendent's Office
(management of common facilities and welfare of employees at Tsukuba research centers)
Standards Department
Standards Division
(general coordination within the department, oversight and promulgation of Japanese Industrial Standards and JIS marks, coordination with JSA and international bodies)
Material Standards Division
(industrial standards in the fields of metals, civil engineering, construction and mining, and ordinary industrial standardization matters)
Textile and Chemical Standards Division
(industrial standards in the fields of chemicals, textiles, ceramics, daily necessities and packaging)
Machinery Standards Division
(industrial standards in the fields of machinery, aircraft, ships, railways, motor vehicles, cycles and industrial vehicles)
Electrical, Electronic and Information Standards Division
(industrial standards in the fields of electrical and electronic equipment, medical

equipment, combustion equipment and nuclear energy, and development of reliability technology for electronic parts)
Director for International Standardization Affairs
(contact and coordination with various national and international standardization bodies)
Research Institutions
National Research Laboratory of Metrology*
Mechanical Engineering Laboratory*
National Chemical Laboratory for Industry*
Fermentation Research Institute*
Research Institute for Polymers and Textiles*
Geological Survey of Japan*
Electrotechnical Laboratory*
Industrial Products Research Institute*
National Research Institute for Pollution and Resources*
Government Industrial Development Laboratory, Hokkaido
Government Industrial Research Institute, Tohoku
Government Industrial Research Institute, Nagoya
Government Industrial Research Institute, Osaka
Government Industrial Research Institute, Chugoku
Government Industrial Research Institute, Shikoku
Government Industrial Research Institute, Kyushu
* Transferred to Tsukuba Science City beginning in FY79

Overall Structure of MITI (as of 1 July 1989)

Ministry of International Trade and Industry
(Minister)
(Parliamentary Vice Ministers) (2)
(Administrative Vice Minister)
(Private Secretary to the Minister)
Ministry Proper
(Vice Minister for International Affairs)
Internal Bureaus
Minister's Secretariat
International Trade Policy Bureau
International Trade Administration Bureau
Industrial Policy Bureau
Industrial Location and Environmental Protection Bureau
Basic Industries Bureau
Machinery and Information Industries Bureau
Consumer Goods Industries Bureau
Councils
Industrial Structure Council
Industrial Technology Council
Board of Mine Safety Examination
Central Mine Safety Committee
Export-Import Transaction Council
Export Inspection and Design Promotion Council
Export Insurance Council
Commodity Exchange Council
Industrial Location and Water Council
Large-Scale Retail Stores Council
Installment Sale Council
Consumer Product Safety and Household Goods Quality Labeling Council
Chemical Product Council
Aircraft Industry Council
Data Processing Promotion Council
Weights and Measures Administration Council
Vehicle Races Council
High Pressure Gas and Explosives Safety Council
Textile Industry Council
Traditional Craft Industry Council
Training and Other Organizations
International Trade and Industry Inspection Institute
Research Institute of International Trade and Industry
Weights and Measures Training Institute
Safety Training Institute
Special Organization
Agency of Industrial Science and Technology
Regional Bureaus
Bureaus of International Trade and Industry
Mine Safety and Inspection Bureaus and Departments
External Bureaus
Agency of Natural Resources and Energy
Patent Office
Small and Medium Enterprise Agency

Structure of Ministry Proper (as of 1 July 1989)

Ministry of International Trade and Industry
(Vice Minister for International Affairs)
Internal Bureaus
Minister's Secretariat
(Director General)
Director General for Policy Coordination
Director General for Commercial Affairs
Deputy Directors General (7)
Counsellors (3)
Personnel Division
General Coordination Division
Budget and Accounts Division
Regional Bureau Administration Division
Public Relations Division
Information Processing Administration Division
Research and Statistics Department
(Director General)
Administration Division
Commercial Statistics Division
Industrial Statistics Division
Statistics Analysis Division
Statistics Administrators (4)
International Trade Policy Bureau
(Director General)
(Deputy Director General)
General Affairs Division
Americas-Oceania Division

West Europe-Africa-Middle East Division
South Asia-East Europe Division
North Asia Division
International Economic Affairs Department
(Director General)
International Economic Affairs Division
Tariff Division
Economic Cooperation Department
(Director General)
Economic Cooperation Division
Technical Cooperation Division
International Trade Administration Bureau
(Director General)
General Affairs Division
Export Division
Import Division
Agricultural and Marine Products Division
Foreign Exchange and Trade Finance Division
Trade Insurance Division
International (Long-Term) Trade Insurance Division
Industrial Policy Bureau
(Director General)
General Affairs Division
Research Division
Industrial Structure Division
Industrial Finance Division
Business Behavior Division
International Business Affairs Division
Commerce Policy Division
Consumer Protection Division
Price Policy Division
Coordination Officer for Large-Scale Retail Stores
Industrial Location and Environmental Protection Bureau
(Director General)
General Affairs Division
Industrial Location Policy Division
Industrial Location Guidance Division
Industrial Facilities Division
Environmental Protection Division
Safety Division
Mine Safety Division
Coal Mine Safety Division
Basic Industries Bureau
(Director General)
General Affairs Division
Iron and Steel Administration Division
Iron and Steel Production Division
Nonferrous Metals Division
Chemical Products Safety Division
Basic Chemicals Division
Chemical Products Division
Biochemistry Industry Division
Alcohol Division
Machinery and Information Industries Bureau
(Director General)
General Affairs Division
Industrial Machinery Division
Cast and Wrought Products Division
Space Industry Division
Electronics Policy Division
Information Systems Development Division
Data Promotion Division
Industrial Electronics Division
Electrical Machinery and Consumer Electronics Division
Automobile Division
Aircraft and Ordnance Division
Vehicle Division
Consumer Goods Industries Bureau
(Director General)
General Affairs Division
International Trade Division
Fibers and Spinning Division
Textile Products Division
Paper-Pulp and Printing Division
Household and Miscellaneous Goods Division
Recreation and Miscellaneous Goods Division
Ceramics and Building Materials Division
Housing Industry Division

Agency of Natural Resources and Energy (as of 1 July 1989)
(Director General)
(Deputy Director General)
Internal Bureaus
Director General's Secretariat
(Deputy Director General)
General Coordination Division
Energy Policy Planning Division
International Energy Policy Division
Energy Conservation and Alternative Energy Policy Division
Mining Division
Nuclear Energy Industry Division
Petroleum Department
(Director General)
Planning Division
Refining Division
Distribution Division
Petroleum Reserve Division
Petroleum Development Division
Coal Mining Department
(Director General)
Coal Policy Division
Coal Mining Administration Division
Coal Mining Area Development Division
Environmental Restoration Division
Public Utilities Department
(Director General)
Planning Division
Electric Power Administration Division
Electric Power Development Division

Electric Power Technology Division
Electricity Power Generation Division
Nuclear Power Division
Nuclear Power Safety Examination Division
Nuclear Power Safety Administration Division
Gas Industry Division
Gas Safety Division
Councils
Advisory Committee for Energy
Mining Industry Council
Petroleum Council
Petroleum Supply and Demand Coordination Council
Coal Mining Council
Coal Mining Area Development Council
Electric Utility Industry Council

Patent Office (as of 1 July 1989)
(Director General)
(Deputy Commissioner)
Internal Bureaus
General Administration Department
(Director General)
Personnel Division
General Administration Division
Budget and Accounts Division
Publication Division
Patent Information Planning Division
Patent Information Management Division
Electric Data Processing Administration Division
International Affairs Division
First Examination Department
(Director General)
First Formalities Examination Division
Second Formalities Examination Division
Application Division
Registration Division
Trademark Division
Design Division
Examination Divisions (7)
Second Examination Department
(Director General)
Coordination Division
Examination Divisions (7)
Third Examination Department
(Director General)
Examination Divisions (9)
Fourth Examination Department
(Director General)
Examination Divisions (9)
Fifth Examination Department
(Director General)
Examination Divisions (8)
Department of Appeal
(Director General)
Clerical Division
Appeal Examiners (83)
Councils
Industrial Property Council
Patent Attorney Examination and Disciplinary Committee
Attached Organs
Industrial Property Library
Industrial Property Institute

Small and Medium Enterprise Agency (as of 1 July 1989)
(Director General)
(Deputy Director General)
Internal Bureaus
Director General's Secretariat
Coordination Division
Research Division
Planning Department
(Director General)
Planning Division
Finance Division
Promotion Division
Subcontract Enterprise Division
Guidance Department
(Director General)
Guidance Division
Cooperatives Division
Technology Division
Trade and Wholesale Division
Small Enterprise Department
(Director General)
(Deputy Director General)
Small Enterprise Policy Division
Retail Commerce Division
Councils
SME Policy-Making Council
SME Stabilization Council
SME Business Security Council
SME Modernization Council

Part 1. Research Plans of the Government Industrial Research Institute

FY89 Budget Lists by Institute

Agency of Industrial Science and Technology Budget, FY89

Personnel (full time at end of FY89)			
Research Institute	**Researchers**	**Others**	**Total**
National Research Laboratory of Metrology	129	91	220
Mechanical Engineering Laboratory	218	61	279
National Chemical Laboratory for Industry	280	76	356
Government Industrial Research Institute, Osaka	170	51	221
Government Industrial Research Institute, Nagoya	189	57	246
Fermentation Research Institute	71	18	89
Research Institute for Polymers and Textiles	103	23	126
Geological Survey of Japan	240	120	360
Electrotechnical Laboratory	557	133	690
Industrial Products Research Institute	102	24	126
National Research Institute for Pollution and Resources	248	76	324
Government Industrial Development Lab., Hokkaido	73	23	96
Government Industrial Research Institute, Kyushu	71	20	91
Government Industrial Research Institute, Shikoku	34	10	44
Government Industrial Research Institute, Tohoku	39	15	54
Government Industrial Research Institute, Chugoku	40	12	52
Tsukuba Superintendent's Office	0	62	62
Planned			0
Subtotal	2,564	872	3,436
Other Research Institutions Total	2,564	872	3,436
AIST etc. Appropriation	1	252	253
Grand Total	2,565	1,124	3,689

Note: 1 non-researcher funded from the Special Account for Patents is included with the FRI personnel.

Necessary Expenses for Research in AIST Budget (Unit: ¥ 1,000)

Institute	Travel	Research	Facilities costs	Ship operation	Results	Subtotal
NRLM	734	181,259	4,326		490	186,809
MEL	989	195,305	44,805		7,532	248,631
NCLI	1,600	246,549	45,320		13,336	306,805
GIRL Osaka	1,302	127,350	65,503		7,348	201,503
GIRL Nagoya	1,136	127,581	48,822		8,874	186,413
FRI	527	63,778	4,326		5,970	74,601
RIPT	761	113,902	4,326		8,642	127,631
GSJ	11,859	257,502	26,986	467,544	150	764,041
ETL	1,493	684,562	45,526		14,500	746,081
IPRI	662	95,375	4,326		2,150	102,513
NRIPR	1,525	167,728	30,076		4,666	203,995
GIDL Hokkaido	950	53,682	27,662		1,553	83,847
GIRL Kyushu	935	61,890	49,086		5,222	117,133

Necessary Expenses for Research in AIST Budget (Unit: ¥ 1,000) (Continued)

Institute	Travel	Research	Facilities costs	Ship operation	Results	Subtotal
GIRL Shikoku	376	26,949	27,707		2,389	57,421
GIRL Tohoku	453	25,079			1,212	26,744
GIRL Chugoku	306	34,183			290	34,779
TSO			4,326			4,326
Planned	7,261	148,529		326,221[2)]	33,216	515,227
Subtotal	32,869	2,611,203	433,123	793,765	117,540	3,988,500
Other institutes						0
Total	32,869	2,611,203	433,123	793,765	117,540	3,988,500
AIST approp.			4,386		17,952	22,338
Grand total	32,869	2,611,203	437,509[1)]	793,765	135,492	4,010,838

1) Includes computer rental fees (192,303)

2) See table 1

Table 1

Breakdown	(Unit: ¥ 1,000)
Research exchange, fusion measures	13,408
Research Coordination Promotion Council	1,783
Research Inst./Private Sector Joint Research	274,790
Research Inst. Commissioned Activities	36,240
Total	326,221

Major Programs (Unit: ¥ 1,000)

	Large-scale	Sunshine	Moonlight	Medical	Future industries	Major regional	Biofunction	Regional environment	Total
NRLM	14,613		23,733		34,127		6,858	11,945	91,276
MEL	128,332	59,764	68,466	10,185	19,375		25,486		311,608
NCLI	55,920	97,813	93,269		135,210		30,957	14,722	427,891
GIRL Osaka	89,689	78,975	59,096	11,438	9,783	17,287			266,268
GIRL Nagoya		57,228	12,049		4,876	40,291			114,444
FRI	55,655	7,403			52,995		41,152	13,961	171,166
RIPT	67,875				140,557		27,106		235,538
GSJ		191,179						13,413	204,592
ETL	369,868	115,435	148,501	24,047	664,004		69,261	7,618	1,398,734
IPRI	35,537			16,009	30,702		34,528		116,776
NRIPR	100,983	159,890	16,734					30,086	307,693
GIDL Hokkaido		114,298	17,455			34,944			166,697
GIRL Kyushu		14,447			4,849	38,579			57,875
GIRL Shikoku	10,085	5,239				33,560	7,788		56,672
GIRL Tohoku	4,550	52,842	10,394			29,832			97,618
GIRL Chugoku	4,550	27,978				33,305			65,833

Major Programs (Unit: ¥ 1,000) (Continued)

	Large-scale	Sunshine	Moonlight	Medical	Future industries	Major regional	Biofunction	Regional environment	Total
TSO									0
Planned	37,108[3)]	13,627[3)]	6,086[3)]		59,092[3)]		7,677[3)]	2,571[3)]	126,161
Subtotal	974,765	996,118	455,783	61,679	1,155,570	227,798	250,813	94,316	4,216,842
Other inst.			46,524		9,965				56,489
Total	974,765	996,118	502,307	61,679	1,165,535	227,798	250,813	94,316	4,273,331
AIST approp.	26,436	205,370	44,590	406,178	22,539	7,933	5,929	2,296	721,271
Grand total	1,001,201	1,201,488	546,897	467,857[4)]	1,188,074	235,731	256,742	96,612	4,994,602

3) Includes mobile research (see Table 2)

4) Includes assistance to international joint R&D (401,450)

Table 2

Breakdown	(Unit: ¥ 1,000)	
Special Research		16,071
Designated Research		21,490
(Large-Scale Projects)	7,631	
(Sunshine Project)	3,838	
(Moonlight Project)	1,180	
(Future Industries)	2,385	
(Biofunctions)	5,016	
(Regional Environment)	1,440	
Total		37,561

Research Institute Ordinary Expenses (Unit: ¥ 1,000)

	Personnel	Travel	Agency	Research subjects	Special plant	Other	Total
NRLM	1,385,371	5,173	13,928	176,247		55,711	1,636,430
MEL	1,807,596	7,065	10,108	300,281		234	2,125,284
NCLI	2,375,304	8,978	12,382	387,403		19	2,784,086
GIRL Osaka	1,529,657	6,112	27,632	236,578	6,532		1,806,511
GIRL Nagoya	1,629,926	6,459	36,864	262,629	7,376	38	1,943,292
FRI	561,157	2,064	3,168	98,091		9	664,489
RIPT	866,354	3,192	4,677	143,339			1,017,562
GSJ	2,265,200	35,488	49,245	333,189	6,516	5,974	2,695,612
ETL	4,584,146	18,679	25,769	767,951		11,490	5,408,035
IPRI	886,170	3,433	4,726	141,228			1,035,557
NRIPR	2,149,614	8,834	22,237	340,044		239	2,520,968
GIDL Hokkaido	681,425	3,920	45,236	101,465	2,126	76	834,248
GIRL Kyushu	565,645	3,825	17,471	96,720		34,814	718,475
GIRL Shikoku	275,484	2,147	13,101	46,619	3,019	401	340,771
GIRL Tohoku	315,315	1,828	17,346	53,475	4,049	57	392,070
GIRL Chugoku	316,386	2,381	44,138	54,846	2,239	9	419,999

Research Institute Ordinary Expenses (Unit: ¥1,000) (Continued)

	Personnel	Travel	Agency	Research subjects	Special plant	Other	Total
TSO	5)	5)	5)				0
Planned							0
Subtotal	22,194,750	119,578	348,028	3,540,105	31,857	109,071	26,343,389
Other inst.							0
Total	22,194,750	119,578	348,028	3,540,105	31,857	109,071	26,343,389
AIST approp.							0
Grand Total	22,194,750	119,578	348,028	3,540,105	31,857	109,071[6)]	26,343,389

5) Personnel, employee travel and agency expenses for the Tsukuba Superintendent's Office are included in 8) general administration.

6) See Table 3

Table 3

Breakdown	(Unit: ¥1,000)
Inspection of instruments	67,072
Automobile weight tax	1,097
Land and building rent	40,702
Indemnification and refunds	200
Total	109,071

Miscellaneous AIST Expenditure Categories (Unit: ¥1,000)

	International joint research	Institute facilities	Tsukuba operations	Other	Total
NRLM	6,603		95,413		102,016
MEL			176,947		176,947
NCLI			174,059		174,059
GIRL Osaka	6,766				6,766
GIRL Nagoya	2,694				2,694
FRI			67,369		67,369
RIPT			69,241		69,241
GSJ			224,190		224,190
ETL	18,576		359,321		377,897
IPRI			63,280		63,280
NRIPR			180,868		180,868
GIDL Hokkaido					0
GIRL Kyushu	6,730				6,730
GIRL Shikoku					0
GIRL Tohoku					0
GIRL Chugoku					0
TSO		428,320	4,979,904		5,408,224
Planned	18,179			96,605[7)]	114,784
Subtotal	59,548	428,320	6,390,592	96,605	6,975,065
Other inst.					0
Total	59,548	428,320	6,390,592	96,605	6,975,065
AIST overhead	167,368	2,732		11,191,611[8)]	11,361,711
Grand total	226,916	431,052	6,390,592	11,288,216	18,336,776

7) See Table 4

8) See Table 5

Table 4

Breakdown	(Unit: ¥ 1,000)
Industrial Technology Liaison Conference	601
International cooperation on metrology	3,148
General administration (lab improvements as a part of general management expenses)	76,785
Expenses needed for mobile research	16,071
Total	96,605

Table 5

Breakdown	(Unit: ¥ 1,000)
General administration (excluding Industrial Technology Liaison Conference, international cooperation on metrology, lab improvements as a part of general management expenses)	2,057,117
Internal and external research management system, forecasting system	5,277
Industrial standards	522,310
Funding and assistance to New Energy and Industrial Technology Organization	7,674,907
Contribution to International Human Frontiers Organization	932,000
Total	11,191,611

Special Research in Budgets of Other Agencies and Ministries (unit: ¥ 1,000)

	Small business	Peaceful nuclear	Pollution control	ITIT	Total
NRLM	12,371	36,091	11,519	10,553	70,534
MEL	5,713	18,034	52,743	14,079	90,569
NCLI		15,820	120,715	10,007	146,542
GIRL Osaka		7,670	48,863	667	57,200
GIRL Nagoya	7,262	59,115	8,457	11,745	86,579
FRI			29,276		29,276
RIPT			13,816	540	14,356
GSJ		53,271	84,024	25,359	162,654
ETL		649,192	51,664	18,348	719,204
IPRI			32,464	9,531	41,995
NRIPR		12,229	551,555	10,020	573,804
GIDL Hokkaido			58,169	4,696	62,865
GIRL Kyushu	5,463	11,281	12,071	5,115	33,930
GIRL Shikoku	4,447	19,842		6,994	31,283
GIRL Tohoku				6,484	6,484
GIRL Chugoku			142,298	4,101	146,399
TSO					0
Planned	24,694			10,357	35,051
Subtotal	59,950	882,545	1,217,634	148,596	2,308,725
Other inst.					0
Total	59,950	882,545	1,217,634	148,596	2,308,725
AIST approp.				155,033[10]	155,033
Grand total	59,950[9]	882,545	1,217,634	303,629	2,463,758

9) Includes short-term and long-term training of Technical Leaders (2,134)

10) Includes funds from budgets of the International Trade Policy Bureau's Technical Cooperation Division (45,069) and International Trade Administration Bureau's General Affairs Division (34,442)

Account Categories (Unit: ¥ 1,000)

	AIST research	Major programs	Institute ordinary	AIST misc.	Outside spec. res.	Other outside	Total general	Special accounts	Grand total
NRLM	186,809	91,276	1,636,430	102,016	70,534		2,087,065	24,085	2,111,150
MEL	248,631	311,608	2,125,284	176,947	90,569		2,953,039	227,698	3,180,737
NCLI	306,805	427,891	2,784,086	174,059	146,542		3,839,383	102,864	3,942,247
GIRL Osaka	201,503	266,268	1,806,511	6,766	57,200		2,338,248	213,104	2,551,352
GIRL Nagoya	186,413	114,444	1,943,292	2,694	86,579		2,333,422	205,237	2,538,659
FRI	74,601	171,166	664,489	67,369	29,276		1,006,901	92,911	1,099,812
RIPT	127,631	235,538	1,017,562	69,241	14,356		1,464,328		1,464,328
GSJ	764,041	204,592	2,695,612	224,190	162,654		4,051,089	311,951	4,363,040
ETL	746,081	1,398,734	5,408,035	377,897	719,204		8,649,951	681,746	9,331,697
IPRI	102,513	116,776	1,035,557	63,280	41,995		1,360,121		1,360,121
NRIPR	203,995	307,693	2,520,968	180,868	573,804		3,787,328	95,562	3,882,890
GIDL Hokkaido	83,847	166,697	834,248		62,865		1,147,657	28,432	1,176,089
GIRL Kyushu	117,133	57,875	718,475	6,730	33,930		934,143	7,845	941,988
GIRL Shikoku	57,421	56,672	340,771		31,283		486,147		486,147
GIRL Tohoku	26,744	97,618	392,070		6,484		522,916		522,916
GIRL Chugoku	34,779	65,833	419,999		146,399		667,010		667,010
TSO	4,326			5,408,224			5,412,550		5,412,550
Planned	515,227	126,161		114,784	35,051		791,223	21,914	813,137
Subtotal	3,988,500	4,216,842	26,343,389	6,975,065	2,308,725		43,832,521	2,013,349	45,845,870
Other inst.		56,489					56,489		56,489
Total	3,988,500	4,273,331	26,343,389	6,975,065	2,308,725		43,889,010	2,013,349	45,902,359
AIST approp.	22,338	721,271		11,361,711	155,033	1,136,684	13,397,037	58,239,328	71,636,365
Grand Total	4,010,838	4,994,602	26,343,389	18,336,776	2,463,758	1,136,684[11]	57,286,047	60,252,677	117,538,724

11) See Table 6

Table 6

Breakdown	(Unit: ¥ 1,000)	
Projects related to Small Business		898,790
(Automated sewing system)	875,022	
(Overview of advanced industrial technology application)	23,768	
International assessments		228,689
Operation of Industrial Technology Council		8,731
Industrial Technology Liaison Conference (MITI Cab. Sec.)		474
Total		1,136,684

Special Accounts for Research and Development (Unit: ¥ 1,000)

	Large-scale	Sunshine	Moonlight	Future industries	Other	Total
NRLM	24,085					24,085
MEL	36,949	81,673	94,272	14,804		227,698
NCLI	19,399		73,694	9,771		102,864
GIRL Osaka		27,979	139,842	45,283		213,104
GIRL Nagoya			9,023	196,214		205,237
FRI					92,911	92,911
RIPT						0
GSJ		311,951				311,951
ETL	154,320	348,816	164,616	13,994		681,746
IPRI						0
NRIPR		78,834			16,728	95,562
GIDL Hokkaido			28,432			28,432
GIRL Kyushu				7,845		7,845
GIRL Shikoku						0
GIRL Tohoku						0
GIRL Chugoku						0
TSO						0
Planned				21,914		21,914
Subtotal	234,753	849,253	509,879	309,825	109,639	2,013,349
Other inst.						0
Total	234,753	849,253	509,879	309,825	109,639	2,013,349
AIST approp.	8,942,496	35,763,460	9,248,437	1,971,865	2,313,070	58,239,328
Grand Total	9,177,249	36,612,713[12)]	9,758,316	2,281,690[13)]	2,422,709	60,252,677[14)]

12) Includes funds from ANRE budget (10,675,690)

13) Includes funds from budget of Basic Industry Bureau's Alcohol Division (210,000)

14) See Table 7

Table 7. The amounts listed below were budgeted from the Special Account for Patents, the Coal Mining and Petroleum Industry Special Account, the Electric Power Development Special Account and the Alcohol Monopoly Special Account. The overall budget related to AIST came to ¥ 117.5 trillion, of which the budget for research institutes constituted 39 percent, or ¥ 45.8 billion.

Breakdown	Special account	(Unit: ¥ 1,000)
Patent Microorganism Center (FRI)	Patents	92,911
Mining safety technology research (NRIPR)	Petroleum	16,728
Subtotal		109,639
Large-scale Industrial R&D		9,176,719
	Petroleum	4,164,297
	Electric	5,012,422
New energy technology R&D		36,612,713
	Petroleum	13,674,005
(including ANRE funds)	Electric	22,938,708
Energy conservation technology R&D	Electric	9,757,982
Alternative energy commercialization R&D		2,085,429
	Petroleum	1,852,996
	Electric	232,433

Table 7. The amounts listed below were budgeted from the Special Account for Patents, the Coal Mining and Petroleum Industry Special Account, the Electric Power Development Special Account and the Alcohol Monopoly Special Account. The overall budget related to AIST came to ¥117.5 trillion, of which the budget for research institutes constituted 39 percent, or ¥45.8 billion. (Continued)

Breakdown	Special account	(Unit: ¥1,000)
Future industries basic technology R&D		2,281,690
	Electric	1,921,690
	Petroleum	150,000
(including Basic Industry Bureau funds)	Alcohol	210,000
Subtotal		59,914,533
Execution of Industrial Standards Law	Electric	161,829
Overseas applications for patent rights		15,812
	Petroleum	8,723
	Electric	7,089
International research cooperation projects	Petroleum	50,000
Subtotal		227,641
Total		60,251,813

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